Grade 10 Science Karnataka 2017

General Instructions to the Candidate :

1. This Question Paper consists of 42 objective and subjective types of questions.
2. This question paper has been sealed by reverse jacket. You have to cut on the right side to open the paper at the time of commencement of the examination. Check whether all the pages of the question paper are intact.
3. Follow the instructions given against both the objective and subjective types of questions.
4. Figures in the right hand margin indicate maximum marks for the questions.
5. The maximum time to answer the paper is given at the top of the question paper. It includes 15 minutes for reading the question paper.
6. Four alternatives are given for each of the following questions / incomplete statements. Only one of them is correct or most appropriate. Choose the correct alternative and write the complete answer along with its letter of alphabet.

10 X 1 = 10

Q1. The change that occurs in the eye to see the distant objects clearly is

(A) focal length of the eye lens decreases

(B) curvature of the eye lens increases

(C) focal length of the eye lens increases

(D) ciliary muscles of the eye contract

Solution:

(C) —focal length of the eye lens increases

When the eye adjusts to see distant objects clearly, the focal length of the eye's lens becomes longer. This helps the light rays focus properly on the retina, allowing us to see faraway things clearly.

Q2. The functional groups present in propanol and propanal respectively are

(A) -OH and -CHO

(B) -OH and -COOH

(C) -CHO and -COOH

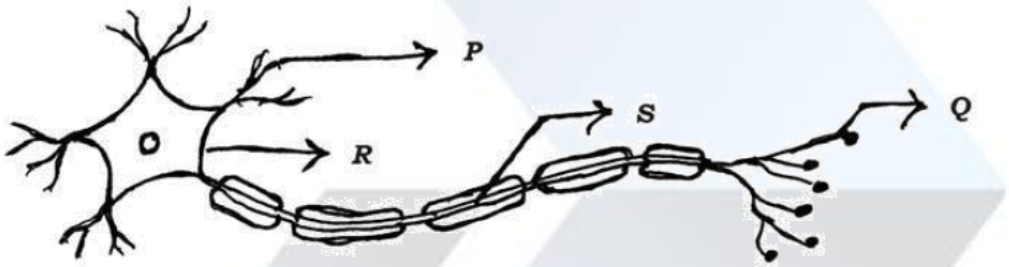
(D) -CHO and -CO

Solution:

(A) -OH and -CHO

Propanol contains the -OH group, known as the hydroxyl group, while propanal has the -CHO group, called the aldehyde group. These functional groups give each compound its unique properties.

Q3. The correct path of the movement of nerve impulses in the for diagram is



(A) $Q \rightarrow S \rightarrow R \rightarrow P$

(B) $P \rightarrow Q \rightarrow R \rightarrow S$

(C) $S \rightarrow R \rightarrow Q \rightarrow P$

(D) $P \rightarrow R \rightarrow S \rightarrow Q$

Solution:

(D) $-P \rightarrow R \rightarrow S \rightarrow Q$

Q4. The resistance of a conductor is 27 Ω. If it is cut into three equal parts and connected in parallel, then its total resistance is

(A) 6Ω

(B) 3Ω

(C) 9 Ω

(D) 27Ω

Solution:

(B) 3 Ω

A conductor has a resistance of 27 Ω. If it is divided into three equal parts and these parts are connected in parallel, the total resistance becomes 3 Ω. This happens because cutting the conductor reduces the resistance of each part, and connecting them in parallel further lowers the overall resistance.

Q5. The chemical equation that represents neutralization reaction among the following is

(A) $BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + 2HCl$

(B) $MnO_2 + 4\,HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$

(C) $2\,NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$

(D) $AgNO_3 + HCl \rightarrow AgCl + HNO_3$

Solution:

(C) $2\,NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$

The chemical equation that shows a neutralization reaction from the given options is $2\,NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$

Q6. By constructing Khadin check-dams in level terrains,

(A) underground water level decrease

(B) underground water level increases

(C) vegetation in the nearby areas are destroyed due to excess moisture

(D) underground water gets polluted

Solution:

(B) underground water level increases.

Khadin check-dams in level terrains are especially useful in regions where water conservation is crucial.

Q7. To obtain a diminished image of an object from a concave mirror, position of the object should be

(F = principal focus, C = centre of curvature, P = pole)

(A) between C and F

(B) beyond C

(C) between P and F

(D) between P and F

Solution:

(B) beyond C

To obtain a diminished image of an object from a concave mirror, position of the object should be beyond C.

Q8. The electronic configuration of element X is 2,8,8,1 and the electronic configuration of element Y is 2,8,7. Then the type of bond formed between these two elements is

(A) covalent bond

(B) hydrogen bond

(C) metallic bond

(D) ionic bond

Solution:

(D) - ionic bond

Element X has an electronic configuration of 2,8,8,1, while element Y has an electronic configuration of 2,8,7. When these two elements react, they form an ionic bond. This happens because element X can easily lose one electron, and element Y can readily gain that electron to achieve a stable configuration.

Q9. Part of the flower that develops into fruit and part of the seed that develops into root respectively are

(A) ovary and plumule

(B) plumule and radicle

(C) ovary and radicle

(D) ovary and ovule

Solution:

(C) - ovary and radicle.

The ovary is the part of a flower that turns into a fruit, while the radicle is the part of a seed that grows into the root. These parts play an important role in the growth and development of plants.

Q10. A pure dominant pea plant producing round - yellow seeds is crossed with pure recessive pea plant producing wrinkled - green seeds. The number of plants bearing round - green seeds in the F_1 generation of Mendel's experiment is

(A) 0

(B) 1

(C) 3

(D) 9

Solution:

(A) -0

In Mendel's experiment, a pure dominant pea plant with round, yellow seeds was crossed with a pure recessive pea plant that had wrinkled, green seeds. In the F1 generation, none of the plants showed round, green seeds. This is because the dominant traits for round shape and yellow color appeared together, while the recessive traits were hidden.

Q11. The functions of hormones are given in Column-A and the names of the hormones are given in Column-B. Match them and write the answer along with its letters: $4 \times 1 = 4$

Column - A	***Column - B***
(A) Prepares the body to deal with the situation	(i) Growth hormone
(B) Regulates metabolism for body growth	(ii) Testosterone
(C) Regulates blood sugar levels	(iii) Adrenaline
(D) Regulates the growth and development of the body	(iv) Progesterone
	(v) Insulin
	(vi) Thyroxine
	(vii) Oestrogen.

Solution:

(A) - (iii) Adrenaline

(B) - (vi) Thyroxine

(C) - (v) Insulin

(D) - (i) Growth hormone

Answer the following questions $7 \times 1 = 7$

Q12. Name the acid present in the stinging hair of nettle leaves.

Solution:

The name of the acid present in the stinging hair of nettle leaves is Methanoic acid.

Q13. What are fossils?

Solution:

Fossils are the remains or imprints of ancient living organisms preserved in rocks or other materials.

Q14. Convex mirror is commonly used as rear-view mirror in vehicles. Why ?

Solution:

A convex mirror is often used as a rear-view mirror in vehicles because:

- It always forms an upright, smaller image.
- Its outward curved surface provides a wider field of view.

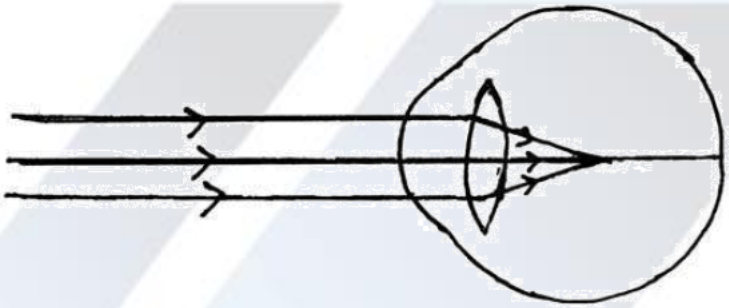
This helps drivers see more of the road and nearby vehicles, making driving safer.

Q15. What is roasting in metallurgy?

Solution:

Heating of metallic ores strongly in the presence of excess air.

Q16. Observe the given figure. Name the eye defect indicated in the figure and also mention the lens used to correct this defect.



Solution:

The eye defect indicated in the figure is Myopia and the lens used to correct this defect is concave lens.

Q17. What is Tyndall effect?

Solution:

When light passes through a colloidal solution, it gets scattered by the tiny particles present in it. This scattering of light is known as the Tyndall effect. Because of this effect, the path of light becomes visible in the solution.

Q18. Under what condition is lactic acid produced in the muscle cells ?

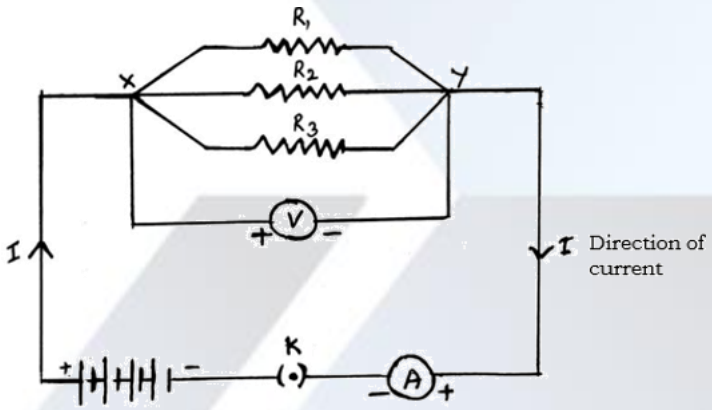
Solution:

Lactic acid forms in muscle cells when there isn't enough oxygen available. This usually happens during intense physical activities when the body can't supply oxygen quickly enough.

Q19. Draw the diagram of an electric circuit in which the resistors R_1,R_2 and R_3 are connected in parallel including an ammeter and a voltmeter and mark the direction of the current.

Solution:

Electric circuit connected in parallel.



Q20. Name the brown fumes liberated when lead nitrate is heated. Write the balanced chemical equation for this reaction.

Solution:

When lead nitrate is heated, it releases brown-colored fumes, which are made up of nitrogen dioxide (NO2). This gas has a sharp, irritating smell and is harmful if inhaled. The balanced chemical equation for this reaction is:

$2\ Pb(NO_3)_2 \rightarrow 2PbO + 4NO_2 + O_2$

Q21. Explain the process of translocation of food materials in plants.

OR

Explain the process of digestion in the small intestine of man.

Solution:

The movement of food materials in plants happens through the phloem tissue. This process occurs in the sieve tubes with the support of nearby companion cells, allowing the food to travel both upwards and downwards. This helps in distributing nutrients to different parts of the plant. This process is achieved by osmotic pressure.

OR

Digestion of Food in the Small Intestine:

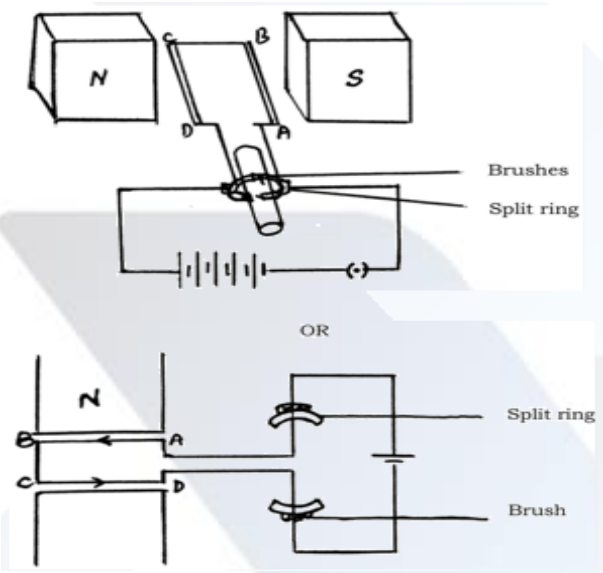
- The small intestine is where the complete digestion of proteins, carbohydrates, and fats takes place.
- The walls of the small intestine have glands that produce intestinal juice.
- This intestinal juice contains enzymes that break down proteins into amino acids, complex carbohydrates into glucose, and fats into fatty acids and glycerol.
- The digested food is then absorbed by tiny finger-like structures called villi, which are present on the inner walls of the small intestine.
- These villi increase the surface area for better absorption of nutrients into the bloodstream.

Q22. Draw the diagram of a simple electric motor. Label the following parts :

(i) Split rings (ii) Brushes.

Solution:

The diagram of a simple electric motor is shown below:



Q23. What are structural isomers? Name the first member of alkanes that shows structural isomerism.

Solution:

Compounds that have the same molecular formula, but different arrangements of atoms are known as structural isomers. Butane, with the formula C_4H_{10}, is the first alkane to show structural isomerism. This means it can exist in more than one structural form, even though it has the same number of atoms.

Q24. Draw the diagram showing the longitudinal section of a flower.

Label the following parts:

Solution:

(i) Style (ii) Anther.

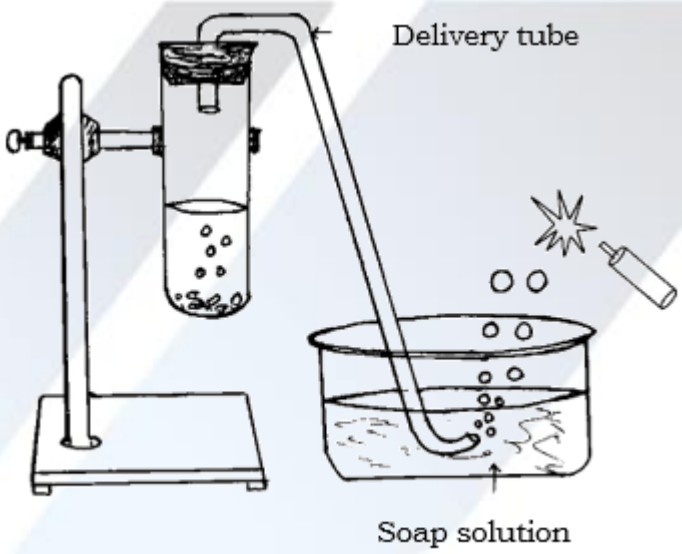
Longitudinal section of a flower

Q25. Draw the diagram of arrangement of apparatus used to show the reaction of zinc granules with dilute sulphuric acid and testing hydrogen gas by burning. Label the following parts.

(i) Soap solution

(ii) Delivery tube.

Solution:



Q26. It is advantageous to connect electric devices in parallel instead of connecting them in series. Why?

OR

According to Joule's law of heating, mention the factors on which heat produced in a resistor depends. According to this law write the formula used to calculate the heat produced.

Solution:

In a **series circuit**, all appliances share the same current, but they may need different amounts to work properly. If one appliance stops working, the whole circuit breaks, and none of them function. In a **parallel circuit**, the current splits between devices, allowing each to get the required amount based on its resistance. This setup is useful because each appliance can work independently.

OR

Heat produced in a resistor is:

(i) directly proportional to the square of current for a given resistance.

(ii) directly proportional to resistance for a given current, and

(iii) directly proportional to the time for which the current flows through the resistor.

(iv) $H = I^2Rt$

Q27. List the disadvantages of using fossil fuels.

OR

List the advantages of 'reduce' and 'reuse' to save environment.

Solution:

i. Fossil fuels come from biomass, which contains elements like carbon, hydrogen, nitrogen, and sulfur.

ii. Burning fossil fuels produce carbon oxides, water, nitrogen oxides, and sulfur oxides.

iii. High levels of nitrogen oxides, sulfur oxides, and carbon monoxide are toxic and can cause acid rain.

iv. Carbon dioxide is a greenhouse gas, and its continuous increase in the atmosphere leads to severe global warming.

OR

Advantages of reduce and revise to save environment:

Reduce: When we follow the idea of reducing, we can help save important resources like:

- Electricity – Turning off lights and appliances when not in use helps save energy.
- Water – Using water wisely, like fixing leaks, helps conserve this precious resource.
- Food – Avoiding food waste by taking only what we need reduces unnecessary waste.
- Natural resources – Using fewer materials helps protect resources like trees and minerals.
- By using less, we not only save resources but also help protect the environment for future generations.

Reuse: Practicing reuse helps in many ways:

- It reduces environmental pollution – Reusing items means less waste ends up in landfills.
- Materials can be used again without delay – Items like bags and containers can be reused easily at home.
- It helps save energy – Reusing products reduces the energy needed to make new ones.
- It decreases the need for new raw materials – This helps protect natural resources and reduces environmental damage.
- Reusing items also reduces waste, making the planet cleaner and greener.

Q28. The focal length of a concave lens is 30 cm. At what distance should the object be placed from the lens so that it forms an image at 20 cm from the lens?

Solution:

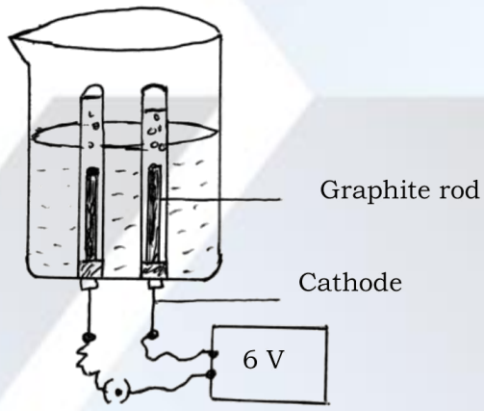
$$\frac{1}{v}-\frac{1}{u}=\frac{1}{f} \text{ or, } \frac{1}{u}=\frac{1}{v}-\frac{1}{f}$$
$$\frac{1}{u}=\frac{1}{-20}-\frac{1}{(-30)}=-\frac{1}{20}+\frac{1}{30}$$
$$\frac{1}{u}=\frac{-3+2}{60}$$
$$\frac{1}{u}=\frac{1}{-60} \text{ or } u=-60 \text{ cm}$$

Q29. Draw the diagram of the apparatus used in the electrolysis of water. Label the following parts.

(i) Graphite rod

(ii) Cathode.

Solution:



(Cathode can be labelled by connecting graphite rod to the negative terminal of the battery)

Q30. Growth of thread-like structures along with the gradual spoilage of tomato can be observed when a cut tomato is kept aside for four days. Interpret the causes of this change.

Solution:

- The thin, thread-like structures growing on a tomato are hyphae of Rhizopus, also known as bread mould.
- These hyphae have small, round structures called sporangia.

- Sporangia hold spores, which help in reproduction.
- When spores land on a moist surface, they start growing.

Q31. An electric refrigerator rated 400 W is used for 8 hours a day. An electric iron box rated 750 W is used for 2 hours a day. Calculate the cost of using these appliances for 30 days, if the cost of 1 kWh is Rs. 3/-.

Solution:

The total energy consumed that is by the refrigerator in 30 days $= 400 \times 8 \times 30$

$= 96000$ Wh $= 96$kWh

The total energy that is consumed by the iron box in 30 days will be

$= 750 \times 2 \times 30$

$= 45000$ Wh $= 45$kWh

The total energy consumed by the refrigerator and iron box will be

$= 96$kWh $+ 45$kWh

$= 141$kWh

The sum of the bill amount for 141 kWh at rate of Rs. 3 per 1 kWh comes out as

$= 141 \times 3$
$=$ Rs. 423.

Q32. There is no change in the colour of red litmus and blue litmus paper when introduced into an aqueous solution of sodium chloride. After passing direct current through the same solution, red litmus changes to blue colour. Which product is responsible for this change? Mention any two uses of this product.

Solution:

Sodium hydroxide / NaOH is responsible for this change. Some uses are:

- **De-greasing Metals:** Cleans metal surfaces by breaking down oils and grease.

- **Soaps and Detergents:** Key in saponification to produce soap from fats/oils.
- **Paper Making:** Breaks down lignin in wood for pulp and aids in bleaching.
- **Artificial Fibres:** Processes cellulose to create rayon and spandex.

Q33. A food chain in a polluted aquatic ecosystem is given. Observe it and answer the following questions.

Fresh water → Algae → Fishes → Birds.

(i) Which organisms are disturbed more due to biomagnification? Why?

(ii) This ecosystem will be destroyed gradually due to biomagnification. Why?

OR

A student places a piece of cucumber, a glass piece, a banana peel and a plastic pen in a pit and closes it. What changes can be observed in these materials after a month? Give scientific reasons for these changes.

Solution:

(i) Birds are more affected by biomagnification because they are at the highest level of the food chain. Harmful chemicals build up as they move through the food chain, reaching their highest concentration in birds. This can harm their health and even affect their ability to survive.

(ii) Biomagnification refers to the buildup of harmful, non-degradable chemicals in different levels of the food chain. Since these chemicals cannot be broken or removed, they keep accumulating in living organisms. Over time, this can damage the balance of the ecosystem and harm various species.

OR

- Cucumber pieces and banana peels are natural materials. They can break down easily over time, making them biodegradable and safe for the environment.

-
- On the other hand, glass pieces and plastic pens are man-made or synthetic materials. They do not decompose naturally, which makes them non-biodegradable and harmful to the soil, causing pollution.

Q34. What is dispersion of light ? Mention the colour that bends the least and the colour that bends the most when light undergoes dispersion through a prism.

OR

Mention any four phenomena that can be observed due to atmospheric refraction of light on the earth.

Solution:

When light breaks up into its different colors, it is called **dispersion** of light. In this process, the red color bends the least, while the violet color bends the most after passing through a prism. This bending of colors happens because each color has a different wavelength.

OR

Here are four phenomena that occur because of the bending of light, known as atmospheric refraction:

- We can see the sun about two minutes before it actually rises.
- The sun remains visible for around two minutes even after it has set.
- Stars seem to twinkle in the night sky.
- Rainbows form due to the bending of light in the atmosphere.

These effects happen because light changes direction when it passes through layers of air with different densities.

Answer the following questions $5 \times 3 = 15$

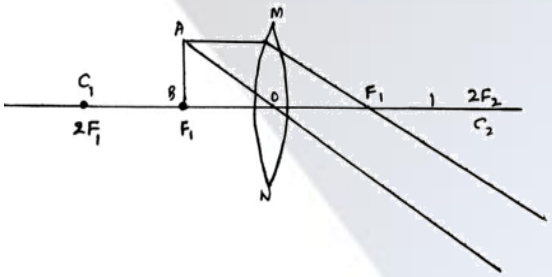
Q35. Draw the ray diagrams for the image formation in a convex lens when an object is placed

i. at focus F_1

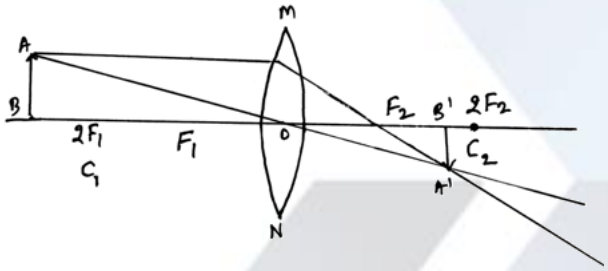
ii. beyond $2F_1$.

Solution:

(i) At focus F_1



(ii) Beyond $2F_1$



Q36. (i) Write the difference between saturated and unsaturated hydrocarbons.

(ii) Write the molecular formula and structural formula of an alkene having five carbon atoms.

OR

(i) Carbon atom does not form C^{4-} anion and C^{4+} cation. Why?

(ii) How can ethanol be converted into ethanoic acid?

Solution:

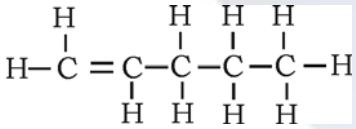
(i) **Saturated hydrocarbons:**

- In these compounds, carbon atoms are connected by single bonds.
- They usually do not react easily.

Unsaturated hydrocarbons:

- These compounds have carbon atoms linked by double or triple bonds.
- They are more reactive compared to saturated hydrocarbons.

(ii) The molecular formula of an alkene with five carbon atoms is C5H10. Its structural formula shows how the atoms are arranged, including the position of the double bond, which is a key feature of alkenes. This formula helps in understanding the bonding and structure of the molecule.



OR

(i) Carbon has the ability to gain four electrons, but this would make it hard for its nucleus, which has six protons, to hold onto a total of ten electrons. Losing four electrons is also difficult because it would need a lot of energy to remove them, leaving a carbon ion with only two electrons and six protons in its nucleus.

(ii) When alkaline potassium permanganate or acidified potassium dichromate is added to ethyl alcohol and heated, it undergoes oxidation and changes into ethanoic acid. Its chemical reaction is:

$$CH_3 - CH_2 - OH \xrightarrow[\text{Or}\ \text{Acidic } K_2Cr_2O_7 + \text{Heat}]{\text{Alkaline } KMnO_4 + \text{Heat}} CH_3COOH$$

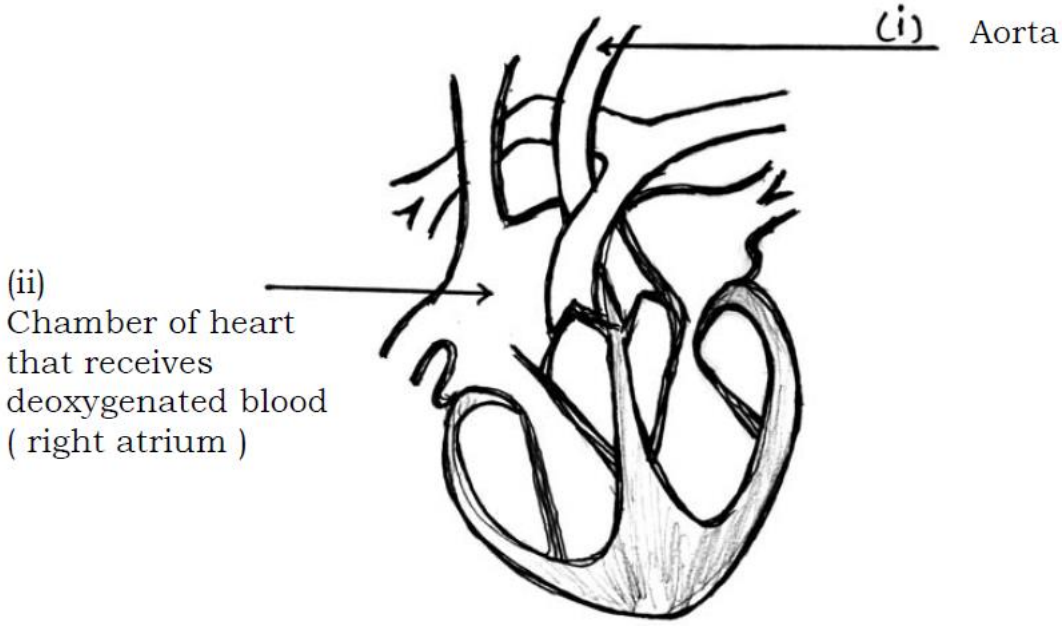
Q37. Draw the diagram showing the sectional view of the human heart. Label the following parts.

(i) Aorta

(ii) Chamber of heart that receives deoxygenated blood.

Solution:

Diagram of sectional view of human heart is as follows:



Q38. (i) Name the major constituent of biogas. Write the properties of biogas which make it a good fuel.
(ii) Name the two devices that work using heat energy of the sun.

OR

(i) Write the advantages of solar cells.

(ii) Write any two hazards of nuclear power generation.

Solution:

(i) The major constituent of biogas is Methane (CH_4). Some of the properties of biogas which make good fuel.

- Leaves no residue like ash.
- It burns without smoke/ecofriendly.
- Its heating capacity is high.

(ii) Here are two devices that use the sun's heat energy:

- **Solar water heater:** It uses sunlight to heat water for household or industrial use.
- **Solar cooker:** It uses the sun’s heat to cook food without the need for gas or electricity.

OR

Solution:

(i) Some advantages of solar cells are as follows:

- They do not have any moving parts.
- They need very little maintenance and function well without a focusing device.
- They can be installed in remote or hard-to-reach villages.
- They are useful in areas with very few people, where setting up power lines is costly and not practical.

(ii) Two hazards of nuclear power generation are:

- Improper storage and disposal of nuclear waste can pollute the environment.
- There is also a chance of accidental radiation leakage.

Q39. Observe the given table and answer the following question:

Elements	*A*	*B*	*C*	*D*	*E*
Atomic number	11	4	2	7	19

Identify the two elements that belong to the same period and the two elements that belong to the same group. Give a reason for your conclusion.

Solution:

- Element B and element D belong to the same period because both have two electron shells.

- Element A and Element E belong to the same group because both have a single electron in their outermost shell. This similarity in their electron arrangement gives them similar chemical properties.

Answer the following questions $3 \times 4 = 12$

(i) How does overload and short-circuit occur in an electric circuit? Explain. What is the function of fuse during this situation?

(ii) Mention two properties of magnetic field lines.

Solution:

(i) Overloading happens when the live wire touches the neutral wire directly. This can occur if the wire insulation is damaged or if there is a fault in an electrical appliance. It can also happen when too many electrical devices are connected to a single circuit at the same time. In such cases, the current in the circuit rises sharply, causing a short circuit. The fuse in the circuit melts due to the heat produced by the high current, which breaks the circuit and protects the electrical devices from damage.

(ii) Some properties of magnetic field:

- Magnetic field lines never cross each other.
- They are denser near the poles of a magnet, showing a stronger magnetic field in those areas.
- These field lines start from the north pole and end at the south pole.
- Inside the magnet, the direction of the field lines is from the south pole back to the north pole, forming a closed loop.

Q40. Give reasons :

(i) Ionic compounds in solid state do not conduct electricity, whereas in molten state are good conductors of electricity.

(ii) Silver articles when exposed to air gradually turn blackish.

(iii) Chemical reaction does not take place when copper is added to iron sulphate solution.

OR

Give reasons:

(i) "Alloys of iron are more useful when compared to pure iron."

(ii) Copper loses its brown layer gradually when exposed to air.

(iii) Aluminium oxide is called amphoteric oxide.

Solution:

(i)

- In solid form, ionic compounds do not conduct electricity because their ions cannot move freely due to their rigid structure and strong attraction between positive and negative ions.
- In the molten state, heat weakens the electrostatic forces between oppositely charged ions, allowing them to move freely and conduct electricity.

(ii) Silver reacts with sulphur in the air, forming a layer of silver sulphide.

(iii) Copper is less reactive than iron.

OR

(i) "Alloys of iron are more useful when compared to pure iron." This is because:

- Pure iron is very soft.
- Stretches easily when hot.
- Alloys are strong and tough.
- The characteristics of iron can be altered when it is combined with other materials. This helps improve its strength, durability, and usefulness for different purposes.

(ii) When copper comes in contact with moist carbon dioxide in the air, it gradually loses its shiny brown appearance and forms a green layer.

(iii) Aluminium oxide (Al_2O_3) can react with both acids and bases, resulting in the formation of salt and water.

Q41. (i) Write the differences between homologous organs and analogous organs.
(ii) Write the differences between the sex chromosomes of man and sex chromosomes of woman.
(iii) Sex of a child is determined by the father. How?

Solution:

(i) Differences between homologous organs and analogous organs is given below:

Homologous organs	**Analogous organs**
Organs in different organisms come from the same origin.	The organs of various organisms come from different origins.
Their structures are alike, but they serve different functions.	Their structures are different, but they serve the same function.
Ex. The forelimbs of a frog and a bird are different in structure but serve similar functions, such as movement or support.	Ex. The wings of a bird and the wings of a bat are different. Though they both help in flying, bird wings are made of feathers, while bat wings are formed by a membrane of skin.

(ii) A woman has two X chromosomes, while a man has one X chromosome and one smaller Y chromosome.

(iii) If a child gets an X chromosome from the father, the child will be a girl. If the child gets a Y chromosome from the father, the child will be a boy. Both girls and boys inherit an X chromosome from their mother. Therefore, the father's chromosome determines the child's sex.